Concept of Problem Solving

- A computer cannot solve a problem on its own. One has to provide step by step solutions of the problem to the computer. In fact, the task of problem solving is not that of the computer. It is the programmer who has to write down the solution to the problem in terms of simple operations which the computer can understand and execute.

Concept of Problem Solving

- In order to solve a problem by the computer, one has to pass though certain stages or steps. They are
  - 1. Understanding the problem
  - 2. Analyzing the problem
  - 3. Developing the solution
  - 4. Coding and implementation.

Concept of Problem Solving

- 1. **Understanding the problem:** Here we try to understand the problem to be solved in totally. Before with the next stage or step, we should be absolutely sure about the objectives of the given problem.
- 2. **Analyzing the problem:** After understanding thoroughly the problem to be solved, we look different ways of solving the problem and evaluate each of these methods. The idea here is to search an appropriate solution to the problem under consideration. The end result of this stage is a broad overview of the sequence of operations that are to be carries out to solve the given problem.

Concept of Problem Solving

- 3. **Developing the solution:** Here the overview of the sequence of operations that was the result of analysis stage is expanded to form a detailed step by step solution to the problem under consideration.
- 4. **Coding and implementation:** The last stage of the problem solving is the conversion of the detailed sequence of operations in to a language that the computer can understand. Here each step is converted to its equivalent instruction or instructions in the computer language that has been chosen for the implementation.

Program Design / How to write a Program

- To write a program for a computer to follow, we must go through a two-phase process:
  - problem solving and
  - implementation

Program Design / How to write a Program

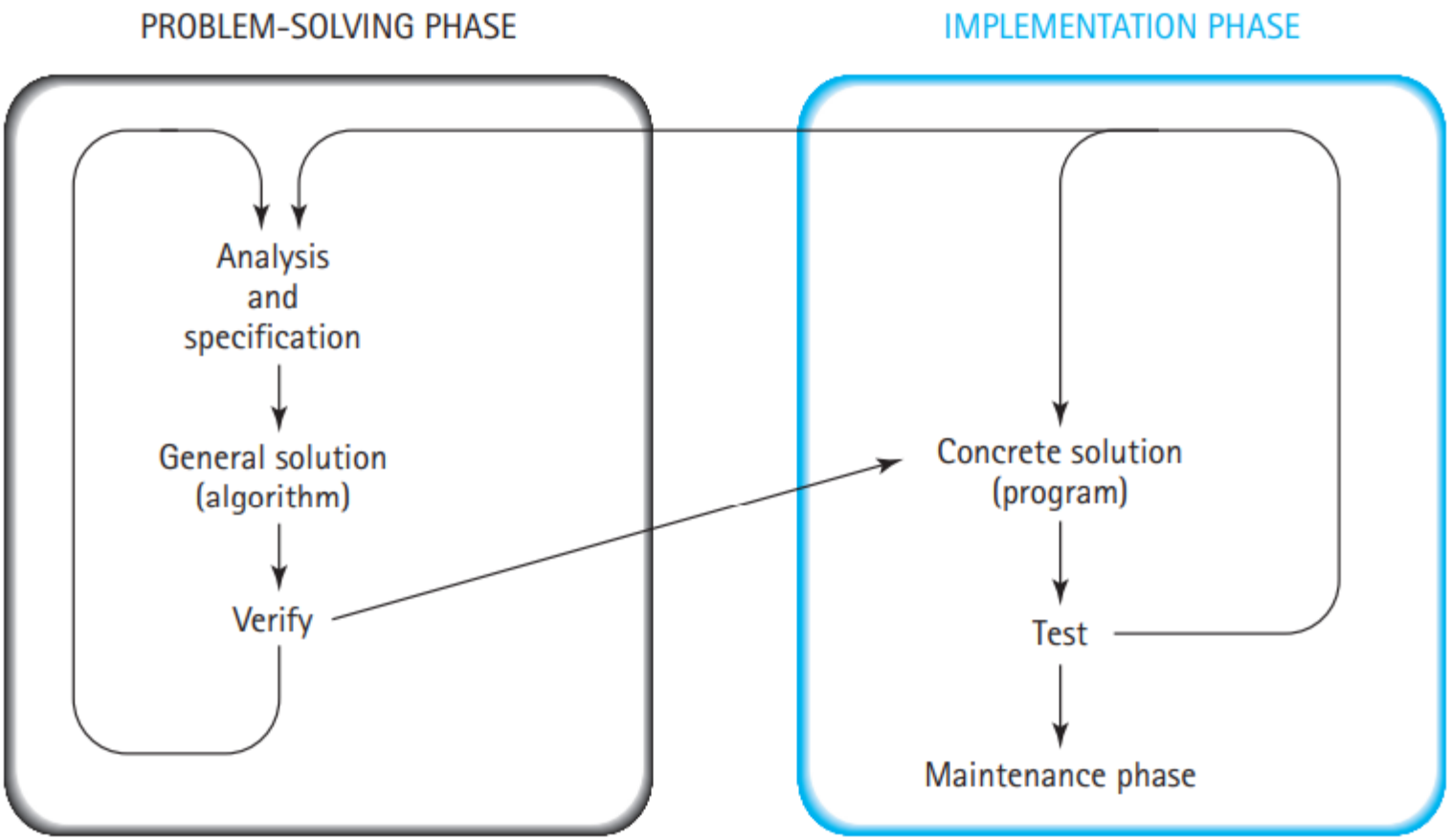

Figure 1.1 *Programming process*

Program Design / How to write a Program

- Problem-Solving Phase:
  - 1. Analysis and Specification: Understand (define) the problem and what the solution must do.
  - 2. General Solution (Algorithm): Specify the required data types and the logical sequences of steps that solve the problem.
  - 3. Verify: Follow the steps exactly to see if the solution really does solve the problem.

Program Design / How to write a Program

- Implementation Phase
  - 1. Concrete Solution (Program): Translate the algorithm (the general solution) into a programming language.
  - 2. Test: Have the computer follow the instructions. Then manually check the results. If you find errors, analyze the program and the algorithm to determine the source of the errors, and then make corrections.
- Once a program has been written, it enters a third phase: maintenance.

Program Design / How to write a Program

- Maintenance Phase
  - 1. Use: Use the program.
  - 2. Maintain: Modify the program to meet changing requirements or to correct any errors that show up while using it.

- Computer program is data type specifications and instructions for carrying out operations that are used by a computer to solve a problem.
- Computer programming is the process of specifying the data types and the operations for a computer to apply to data in order to solve a problem.
- Data type is the specification of how information is represented in the computer as data and the set of operations that can be applied to it.